## REMARKS

The Final Office Action of January 11, 2012, has been carefully considered.

Claims 1-9 have been finally rejected under 35 USC 103(a) as being obvious over Shimada et al. in view of Cane et al.

Favorable reconsideration and withdrawal of the rejection is urged, in view of the following remarks.

The Shimada et al. reference discloses the measurement of the melanin and blood concentration in a human skin by means of a Monte Carlo simulation.

The Applicants submit that this document does not relate to a method for determining the color effect of a series of layers in teeth or dental materials.

The gaps left by Shimada et al. are not filled by the Cane et al. reference, because Cane et al. relates to a method and apparatus for investigating tissue histology.

In other words, the Patent Office has not established the existence of any prior art references dealing with the determination of the color effect of a series of layers in teeth or dental materials. However, the color effect is of special importance with teeth since the dental prosthesis is meant to have a color effect corresponding to that of the surrounding teeth between which the artificial tooth or other

prosthesis is to be inserted.

According to Cane et al., the skin histology is to be measured non-invasive (column 1, lines 32, 33). A spectroscopic examination is carried out with the radiation remitted by the skin being measured. Data is determined concerning the difference between the radiation projected onto the skin and the remitted radiation. Then mathematic models are used describing the optical characteristic of the skin followed by a comparison between healthy skin and skin to be analyzed by measurement of melanin (see e.g. claim 1 or abstract).

Consequently, the comparison between healthy skin and skin to be measured is imperative. Such a method step, however, even when transferring this to teeth, cannot be found in the teaching of the invention.

Notwithstanding the above, Cane et al. does not use a forward Monte Carlo simulation and an inverse Monte Carlo simulation to determine a corrected absorption coefficient.

To determine the corrected absorption coefficient according to the teaching of the invention, the remission of the material is calculated, the color effect of which is to be determined under consideration of an optically dense layer.

There is also no mention or suggestion in Shimada et al.

of a step for calculating an absorption coefficient.

Accordingly, the essential feature of the invention is not disclosed or suggested by the prior art.

The object of the present invention is to more accurately than previously be able to calculate and thus predict the color perception for multilayer systems of combinations of various dispersive materials or biological substances consisting of combined, different layers with various optical properties for varying layer thicknesses without having to repeatedly produce samples consisting of the combined layer thicknesses of interest and to have to measure the color effect, e.g. in conventional color spectrophometers, in each case.

The invention provides a correction of the absorption coefficient by a two-stage method, said absorption coefficient being determined at layers enabling a transmission of light. This improves the accuracy of the determination of the remission and consequently the color effect of the multilayer system. Measured are thereby, for instance, in a first measuring process in a spectrometer the remission and transmission properties at a sample thickness being ideal for the subsequent inverse Monte Carlo simulation. The sample thickness is ideal when the collimated transmission

Tc is in a defined range of values. Hence, layer thicknesses are to be taken as basis which enable such a collimated transmission. If the materials are extremely dispersive or in the event of biological tissue, samples with very low layer thickness result normally. However, the absorption coefficient cannot be determined precisely enough from those small layer thicknesses, since too less dispersion and absorption actions take place and the uncertainties in the determination of the absorption coefficient using inverse Monte Carlo simulation is correspondingly higher.

Therefore, for correcting the absorption coefficient, the invention provides in a second stage a further measurement (only remission properties) at an optical dense counter sample and the recalculation of the value determined firstly for the absorption coefficient by use of the measurements of the optical dense sample and the previously determined values of the dispersion coefficient and the anisotropy factor. The corrected absorption coefficient thus achieved is then taken as basis of the following Monte Carlo simulation for calculating the remission of the multilayer system. A sufficiently accurate determination of the color effect of the multilayer system is achieved only with this procedure.

According to the invention, the remission of the

multilayer systems is determined sufficiently accurate in two stages by means of Monte Carlo simulations basing on intrinsic optical parameters, each with different sample layer thicknesses by means of a correction of the absorption coefficient.

Certainly, Shimada et al. also makes use of the Monte Carlo simulation and inverse Monte Carlo simulation as disclosed under cipher 2.2 on pages 2398, 2399.

However, Shimada et al. does not teach correction of the absorption coefficient, wherein remission of the material to be measured has an optically dense layer with a thickness dD. Rather, Shimada et al. reads on page 2399, 3rd paragraph:

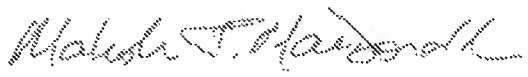
> "To obtain μs and μa, several algorithms for the inverse Monte Carlo method were explored (Dam et al 2000). In this study the Monte Carlo simulation was iterated with varying μs and μa until the differences between the calculated reflectance / transmittances and measured versions fell below the thresholds. The photon number was 100,000 and the thresholds were 0.01 times reflectance and transmittance."

Hence, totally different measures are chosen to correct the absorption coefficient, the corrected absorption coefficient being used for calculating the remission of the color effect of the multi-layer system.

In view of all of the above, it is submitted that the rejection under 35 U.S.C. 103(a) is unsustainable, and should be favorably reconsidered and withdrawn.

Applicant submits that the present application is now in condition for allowance. An early allowance of the application with amended claims is earnestly solicited.

Respectfully submitted,



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